What is claimed is:

1. An etching apparatus comprising:

(a) a rotating means for holding a semiconductor wafer and for rotating said wafer in a horizontal plane;

said wafer having a device area and a surface peripheral area on its surface;

said surface peripheral area being located outside said device area; and

(b) an edge nozzle for emitting an etching liquid toward a surface peripheral area of said wafer;

wherein said etching liquid emitted from said edge nozzle selectively etches out an unnecessary material existing in said surface peripheral area of said wafer.

2. The apparatus according to claim 1, wherein said etching liquid emitted from said edge nozzle has an emission direction oriented along a rotation direction of said wafer or outward with respect to a tangent of said wafer formed near a contact point of said liquid with said surface peripheral area of said wafer.

3. The apparatus according to claim 1, further comprising a back nozzle for emitting an etching liquid toward a back center of said wafer;

wherein said etching liquid emitted from said back nozzle etches out an unnecessary material existing on a back of said wafer.

4. The apparatus according to claim 1, further comprising a surface nozzle for emitting a protecting liquid toward a surface center of said wafer;

wherein said protecting liquid emitted from said surface nozzle covers said device area of said wafer to protect the same against said etching liquid emitted from said edge nozzle.

5. The apparatus according to claim 1, further comprising a back nozzle for emitting an etching liquid toward a back center of said wafer and a surface nozzle for emitting protecting liquid toward a surface center of said wafer;

wherein said etching liquid emitted from said back nozzle etches out an unnecessary material existing on a back of said wafer, and said protecting liquid emitted from said surface nozzle covers said device area of said wafer to protect the same against said etching liquid emitted from said edge nozzle.

6. The apparatus according to claim 1, wherein said etching liquid emitted from said edge nozzle is beam-shaped.

7. The apparatus according to claim 1, wherein said rotating means

is of a roller-chucking type, in which said means comprises rollers arranged along an end face of said wafer, and said rollers are contacted with said end face of said wafer to hold said wafer and rotated synchronously.

8. The apparatus according to claim 1, wherein said rotating means is of a pin-chucking type, in which said means comprises pins supported by a supporting member and arranged along an end face of said wafer, and said pins are contacted with said end face of said wafer to hold said wafer and rotated synchronously by said member.

9. The apparatus according to claim 1, wherein said rotating means is of a pin-chucking type, in which said means comprises a first plurality of pins and a second plurality of pins supported by a supporting member;

wherein said first plurality of pins and said second plurality of pins are alternately arranged along an end face of said wafer;

wherein said first plurality of pins and said second plurality of pins are alternately contacted with said end face of said wafer to hold said wafer and rotated synchronously by said member.

10. The apparatus according to claim 1, wherein said rotating means comprises a first plurality of pins and a second plurality of pins supported by a supporting member;

wherein said first plurality of pins are arranged along an end face of said wafer and said second plurality of pins are arranged along said end face of said wafer;

and wherein said first plurality of pins are contacted with said end face of said wafer to hold said wafer and rotated synchronously by said member in a period, and said second plurality of pins are contacted with said end face of said wafer to hold said wafer and rotated synchronously by said member in another period.

11. The apparatus according to claim 1, wherein the distance of an end of said edge nozzle from a point where a longitudinal axis of said edge nozzle intersects said surface of said wafer is set as a value in the range of 1 mm to 50 mm, and the angle of said edge nozzle with respect to a tangent of said wafer at said point is set as a value in the range of 0° to 90°.

12. The apparatus according to claim 3, wherein the distance of an end of said back nozzle from said back center of said wafer is set as a value in the range of 70 mm to 200 mm, and the angle of said back nozzle with respect to said back of said wafer is

set as a value in the range of 15° to 60°.

13. The apparatus according to claim 4, wherein the distance of an end of said surface nozzle from said surface center of said wafer is set as a value in the range of 70 mm to 200 mm, and the angle of said surface nozzle with respect to said surface of said wafer is set as a value in the range of 15° to 60°.

14. A cleaning apparatus comprising:

(a) a rotating means for holding a semiconductor wafer and for rotating said wafer in a horizontal plane;

said wafer having a device area and a surface peripheral area on its surface;

said surface peripheral area being located outside said device area; and

(b) an edge nozzle for emitting a cleaning liquid toward a surface peripheral area of said wafer;

wherein said cleaning liquid emitted from said edge nozzle selectively removes an unnecessary material existing in said surface peripheral area of said wafer.

15. The apparatus according to claim 14, wherein said cleaning liquid emitted from said edge nozzle has an emission direction oriented along a rotation direction of said wafer or outward with

respect to a tangent of said wafer formed near a contact point of said liquid with said surface peripheral area of said wafer.

16. The apparatus according to claim 14, further comprising a back nozzle for emitting a cleaning liquid toward a back center of said wafer;

wherein said cleaning liquid emitted from said back nozzle removes an unnecessary material existing on a back of said wafer.

17. The apparatus according to claim 14, further comprising a surface nozzle for emitting a protecting liquid toward a surface center of said wafer;

wherein said protecting liquid emitted from said surface nozzle covers said device area of said wafer to protect the same against said cleaning liquid emitted from said edge nozzle.

18. The apparatus according to claim 14, further comprising a back nozzle for emitting a cleaning liquid toward a back center of said wafer and a surface nozzle for emitting protecting liquid toward a surface center of said wafer;

wherein said cleaning liquid emitted from said back nozzle etches out an unnecessary material existing on a back of said wafer, and said protecting liquid emitted from said surface nozzle covers said device area of said wafer to protect the same against said

cleaning liquid emitted from said edge nozzle.

19. The apparatus according to claim 14, wherein said cleaning liquid emitted from said edge nozzle is beam-shaped.

20. The apparatus according to claim 14, wherein said rotating means is of a roller-chucking type, in which said means comprises rollers arranged along an end face of said wafer, and said rollers are contacted with said end face of said wafer to hold said wafer and rotated synchronously.

21. The apparatus according to claim 14, wherein said rotating means is of a pin-chucking type, in which said means comprises pins supported by a supporting member and arranged along an end face of said wafer, and said pins are contacted with said end face of said wafer to hold said wafer and rotated synchronously by said member.

22. The apparatus according to claim 14, wherein said rotating means is of a pin-chucking type, in which said means comprises a first plurality of pins and a second plurality of pins supported by a supporting member;

wherein said first plurality of pins and said second plurality of pins are alternately arranged along an end face of

said wafer;

wherein said first plurality of pins and said second plurality of pins are alternately contacted with said end face of said wafer to hold said wafer and rotated synchronously by said member.

23. The apparatus according to claim 14, wherein said rotating means comprises a first plurality of pins and a second plurality of pins supported by a supporting member;

wherein said first plurality of pins are arranged along an end face of said wafer and said second plurality of pins are arranged along said end face of said wafer;

and wherein said first plurality of pins are contacted with said end face of said wafer to hold said wafer and rotated synchronously by said member in a period, and said second plurality of pins are contacted with said end face of said wafer to hold said wafer and rotated synchronously by said member in another period.

24. The apparatus according to claim 14, wherein the distance of an end of said edge nozzle from a point where a longitudinal axis of said edge nozzle intersects said surface of said wafer is set as a value in the range of 1 mm to 50 mm, and the angle of said edge nozzle with respect to a tangent of said wafer at

said point is set as a value in the range of 0° to 90°.

25. The apparatus according to claim 16, wherein the distance of an end of said back nozzle from said back center of said wafer is set as a value in the range of 70 mm to 200 mm, and the angle of said back nozzle with respect to said back of said wafer is set as a value in the range of 15° to 60°.

26. The apparatus according to claim 17, wherein the distance of an end of said surface nozzle from said surface center of said wafer is set as a value in the range of 70 mm to 200 mm, and the angle of said surface nozzle with respect to said surface of said wafer is set as a value in the range of 15° to 60°.

27. An etching method comprising the steps of:

(a) rotating a semiconductor wafer in a horizontal plane;

said wafer having a device area and a surface peripheral area on its surface;

said surface peripheral area being located outside said device area; and

(b) emitting an etching liquid toward a surface peripheral area of said wafer by an edge nozzle, thereby selectively etching out an unnecessary material existing in said surface peripheral area.

28. The method according to claim 27, wherein said etching liquid emitted from said edge nozzle has an emission direction oriented along a rotation direction of said wafer or outward with respect to a tangent of said wafer formed near a contact point of said liquid with said surface peripheral area of said wafer.

29. The method according to claim 27, wherein an etching liquid is emitted toward a back center of said wafer by a back nozzle, thereby etching out an unnecessary material existing on a back of said wafer.

30. The method according to claim 27, wherein a protecting liquid is emitted toward a surface center of said wafer by a surface nozzle, thereby covering said device area of said wafer to protect the same against said etching liquid emitted from said edge nozzle.

31. The method according to claim 27, wherein an etching liquid is emitted toward a back center of said wafer by a back nozzle, thereby etching out an unnecessary material existing on a back of said wafer, and a protecting liquid is emitted toward a surface center of said wafer by a surface nozzle, thereby covering said device area of said wafer to protect the same against said etching liquid emitted from said edge nozzle.

32. The method according to claim 27, wherein said etching liquid emitted from said edge nozzle is beam-shaped.

33. The method according to claim 27, wherein an acid or an alkali solution containing H_2O_2 is used as said etching liquid.

34. The method according to claim 27, wherein said unnecessary material is Cu;

and wherein said etching liquid is one selected from the group consisting of FPM ($HF/H_2O_2/H_2O$), SPM ($H_2SO_4/H_2O_2/H_2O$), HPM ($HCl/H_2O_2/H_2O$), water solution of nitric hydrogen peroxide ($HNO_3/H_2O_2/H_2O$), APM ($NH_4OH/H_2O_2/H_2O$), and thick nitric acid (HNO_3).

35. The method according to claim 34, wherein a SiO_2 film is formed on or over said surface of said wafer;

and wherein etching liquid has a composition of

$HF : H_2O_2 : H_2O = 1\text{-}10 : 1\text{-}20 : 100$

$H_2SO_4 : H_2O_2 : H_2O = 1\text{-}10 : 1\text{-}20 : 100$

$HCl : H_2O_2 : H_2O = 1\text{-}10 : 1\text{-}20 : 100$

$HNO_3 : H_2O_2 : H_2O = 1\text{-}10 : 1\text{-}20 : 100$

$NH_4OH : H_2O_2 : H_2O = 1\text{-}10 : 1\text{-}20 : 100$

$HNO_3 = 30\% - 80\%$.

36. The method according to claim 34, wherein a SiO_2 film is formed on or over said surface of said wafer;

and wherein etching liquid is FPM having a composition of HF : H_2O_2 : H_2O = 1 : 10 : 100.

37. The method according to claim 27, wherein pure water or a water solution of organic acid is used as said protecting liquid.

38. The method according to claim 37, wherein said water solution of organic acid is a water solution of one selected from the group consisting of oxalic acid, citric acid, and malonic acid;

and wherein said solution of organic acid has a concentration of 0.001 % to 5 %.

39. The method according to claim 27, wherein said unnecessary material is Ta, TaN, or TaO_x;

and wherein hydrofluoric acid (HF) is used as said etching liquid.

40. A cleaning method comprising the steps of:

(a) rotating a semiconductor wafer in a horizontal plane;

said wafer having a device area and a surface peripheral area on its surface;

said surface peripheral area being located outside said

device area; and

(b) emitting a cleaning liquid toward a surface peripheral area of said wafer by an edge nozzle, thereby selectively removing an unnecessary material existing in said surface peripheral area.

41. The method according to claim 40, wherein said cleaning liquid emitted from said edge nozzle has an emission direction oriented along a rotation direction of said wafer or outward with respect to a tangent of said wafer formed near a contact point of said liquid with said surface peripheral area of said wafer.

42. The method according to claim 40, wherein a cleaning liquid is emitted toward a back center of said wafer by a back nozzle, thereby etching out an unnecessary material existing on a back of said wafer.

43. The method according to claim 40, wherein a protecting liquid is emitted toward a surface center of said wafer by a surface nozzle, thereby covering said device area of said wafer to protect the same against said cleaning liquid emitted from said edge nozzle.

44. The method according to claim 40, wherein a cleaning liquid is emitted toward a back center of said wafer by a back nozzle, thereby removing an unnecessary material existing on a back of

said wafer, and a protecting liquid is emitted toward a surface center of said wafer by a surface nozzle, thereby covering said device area of said wafer to protect the same against said cleaning liquid emitted from the said nozzle.

45. The method according to claim 40, wherein said cleaning liquid emitted from said edge nozzle is beam-shaped.

46. The method according to claim 40, wherein an acid or an alkali solution containing H_2O_2 is used as said cleaning liquid.

47. The method according to claim 40, wherein said unnecessary material is Cu;

and wherein said cleaning liquid is one selected from the group consisting of FPM ($HF/H_2O_2/H_2O$), SPM ($H_2SO_4/H_2O_2/H_2O$), HPM ($HCl/H_2O_2/H_2O$), water solution of nitric hydrogen peroxide ($HNO_3/H_2O_2/H_2O$), APM ($NH_4OH/H_2O_2/H_2O$), and thick nitric acid (HNO_3).

48. The method according to claim 40, wherein pure water or a water solution of organic acid is used as said protecting liquid.

49. The method according to claim 48, wherein said water solution of organic acid is a water solution of one selected from the group consisting of oxalic acid, citric acid, and malonic acid;

and wherein said solution of organic acid has a concentration of 0.001 % to 5 %.